APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR		ATTORNEY DOCKET NO.
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022903                    LM02/0504        ⌐
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EXAMINER
CHAUHAN, U

ART UNIT	PAPER NUMBER
2776	10

DATE MAILED: 05/04/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will
  be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this
  communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-41_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-41_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

    a)☐ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

      1.☐ received.

      2.☐ received in Application No. (Series Code / Serial Number) _____ .

      3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

14)☒ Notice of References Cited (PTO-892)
15)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
16)☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _7_ .

17)☐ Interview Summary (PTO-413) Paper No(s). _____ .
18)☐ Notice of Informal Patent Application (PTO-152)
19)☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2.   Claims 1-19, 25, 28, 29, 31, 37, and 40 are rejected under 35 U.S.C. 102(e) as being

anticipated by U. S. Patent 5,790,130 to Gannett.

3.   As per claim 1, Gannett teaches a graphics system comprising a host 15 including a main

memory 17 and a processor 19, a front end board 10, a texture mapping board 12, and a frame

buffer board 14 at Fig. 4. Gannett further teaches that the front end board receives primitives to

be rendered from the host computer over bus 16 at col. 12 lines 35-39. Gannett further teaches a

texture mapping board 12 that includes texture mapping chip 46 and cache memory 48 that

stores texture MIP map data downloaded from the main memory 17 associated with the

primitives being rendered at col. 13 lines 44-55.

4.   As per claim 2, Gannett teaches that texture data for any primitive is downloaded into the

local memory 48 before it is needed by the primitive at col. 42 lines 38-51.

5.   As per claims 3 and 28, Gannett teaches that the when a cache miss occurs the portion of

the texture MIP map needed for the primitive is downloaded from the main memory into the

cache using the texture interrupt managing daemon 160 at col. 10 lines 44-47 and col. 14 lines 37-44.

6.   As per claims 4, 6, and 29, Gannett teaches a texel cache access circuit 82 including controllers for accessing the cache at col. 21 lines 55-63. Gannett further teaches that the cache stores 64 blocks of 256x256 texels at col. 14 lines 10-11. And Gannett teaches that the texture interrupt managing daemon 160 replaces cache blocks based on the least recently used blocks and the low priority blocks at col. 42 lines 6-36.

7.   As per claims 5, 37, and 40, Gannett teaches that the gradients ΔS and ΔT are used to determine the MIP map for providing the texture data at col. 17 lines 13-19. Therefore Gannett teaches determining the scale of the texture map and determining whether the texels can fit into the cache.

8.   As per claim 19, Gannett teaches that the cache is fully associative at col. 18 lines 57-62.

9.   Claims 7, 10-18, and 31 are similar in scope to claims 1-6 and 19 and are rejected under the same rationale.

10.   As per claims 8 and 9, Gannett teaches that the texture interrupt managing daemon 160 considers the recent past frequency of and the predicted future use based on the priorities of texture map portions to determine which portions to replace at col. 8 lines 22-28. And Gannett teaches that the highest priority is given to textures needed for newly created images and the next highest priority given to the most recently used textures at col. 10 line 64-col. 11 line 4.

11.   As per claim 25, Gannett teaches that texture data for any primitive is downloaded into the local memory 48 before it is needed by the primitive at col. 42 lines 38-51.

Claim Rejections - 35 USC § 103

12.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13.   This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

14.   Claims 26, 27, 30, 38, 39, and 41 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U. S. Patent 5,790,130 to Gannett.

15.   As per claim 26, Gannett does not expressly teach that the pre-fetch mode is based on

whether required texels can fit into the cache. It would have been obvious to one of ordinary

skill in the art at the time the invention was made to have pre-fetched texels into the cache only if

there is available space in the cache and otherwise fetch the texels as needed so that texture

processing is accelerated by caching texels when possible.

16.   As per claim 27, Gannett teaches a replacement policy based on the priorities of texture

map portions at col. 8 lines 22-28. And Gannett teaches that the highest priority is given to

textures needed for newly created images and the next highest priority given to the most recently

used textures at col. 10 line 64-col. 11 line 4.

17.   As per claim 30, Gannett does not expressly teach a DMA engine for loading the texture

cache. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to have provided texture data to the cache using a DMA engine for the purpose of

directly transferring the texture data to the cache without burdening the host CPU and at a faster

rate.

18.   As per claims 38 and 39, Gannett does not expressly teach determining whether required

texels fit into ½ of the cache. It would have been obvious to one of ordinary skill in the art at the

time the invention was made to have determined if the required texels being pre-fetched for a

polygon fit into ½ of the texture cache so that a texels required for the current polygon being

processed are not overwritten when the pre-fetching occurs.

19.   As per claim 41, Gannett does not expressly teach that if the required texels do not fit into

the cache then the pre-fetching of the texels is delayed. However, it would have been obvious to

one of ordinary skill in the art at the time the invention was made that if the required texels do

not fit into the cache then the pre-fetching of the texels is delayed because either the space in the

cache has to become available before they can be stored or the required texels have to be fetched
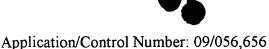
on-demand.

20.   Claims 20-24 and 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U. S. Patent 5,790,130 to Gannett and U. S. Patent 5,945,997 to Zhao et al.

21.   As per claim 20, Gannett teaches that the cache memory stores up to 64 blocks of texture

data each including 256x256 texels at col. 32 lines 23-29. And Gannett teaches Gannett does not

expressly teach that cache stores texels in cache lines. Zhao teaches texture mapping in a

graphics system in which the texture cache 802 stores portions of a texture map on a square by

square basis with each square being stored in a cache line 604 and with the entire cache line 604

being replaced with new data when swapping out occurs at col. 14 lines 5-13. It would have

been obvious to one of ordinary skill in the art at the time the invention was made to have

combined the teachings of Gannett and Zhao so that texels can be easily and efficiently stored

and accessed from the texture cache.

22.   As per claims 21 and 24, Gannett teaches that texels within the cache are addressed using

S and T bits at col. 23 lines 26-38.

23.   As per claims 22 and 23, Zhao teaches accessing the texture cache based on squares with

a z-pattern through the square at col. 14 line 55-col. 15 line 13 and Fig. 9D. And Zhao teaches

that each square is stored in a cache line at col. 14 lines 63-67.

24.   Claims 32-36 are similar in scope to claims 20-24 and are rejected under the same

rationale.

Conclusion

25.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure. The following prior art teach texture processing.

U. S. Patent 6003106 to Fields, Jr., et al   U. S. Patent 6002410 to Battle

U. S. Patent 5990902 to Park   U. S. Patent 5987567 to Rivard et al

U. S. Patent 5886701 to Chauvin et al   U. S. Patent 5844576 to Wilde et al

U. S. Patent 5761720 to Krishnamurthy et al

26.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Ulka J. Chauhan whose telephone number is 305-9651. The

examiner can normally be reached on Mon. through Fri., 9:30 a.m. to 4:00 p.m.

27.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Michael Razavi can be reached on 305-4713. The fax phone numbers for the

organization where this application or proceeding is assigned are 308-6306/6296.

28.   Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 305-3900.

Ulka J. Chauhan
Primary Examiner
Art Unit 2776

ujc
May 2, 2000